

REMARKS

Claims 1-20 are currently pending in the application. Claims 17-20 are newly added. Claims 1-10 and 17-20 are drawn to the elected invention. Claims 11-16 are directed to non-elected invention and may be cancelled by the Examiner upon the allowance of the claims directed to the elected invention. Claim 1 has been amended to recite the pressures employed in steps (b), (c) and (d). The amendments to the claims and newly presented claims 17-20 find support at paragraphs [0136], [0143] and [0148] of the specification. The amendments to the claims and the newly presented claims do not introduce any new matter.

Claims 1-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,536,748 to Drinkard et al., in view of U.S. Patent No. 6,242,633 to Fischer et al.¹ and International Publication No. WO 02/26698 to Jungkamp et al.² The cited references, fail to render obvious the claimed process, as amended, for producing 3-pentene nitrile.

The present invention relates to a process for producing 3-pentene nitrile which comprises the following:

- (a) isomerization of a reactant stream which contains 2-methyl-3- butenenitrile, with at least one dissolved or dispersed isomerisation catalyst, so as to produce a stream 1 which contains at least one isomerization catalyst, 2-methyl-3-butenenitrile, 3-pentenitrile and (Z)-2-methyl-2-butenenitrile;
- (b) distillation of stream 1, so as to yield a stream 2 as a head product which contains 2-methyl-3- butenenitrile, 3-pentenitrile and (Z)-2-methyl-2-butenenitrile, and a stream 3 as a bottom product which contains at least one isomerization catalyst;
- (c) distillation of stream 2, so as to yield a stream 4 as a head product which, in comparison with stream 2 is richer in (Z)-2-methyl-2-butenenitrile, relative to the sum of all pentenenitriles in stream 2, and a stream 5 as a bottom product which, in comparison to stream 2, is richer in 3-pentenitrile and 2-methyl-3-butenenitrile, relative to the sum of all pentenenitriles in stream 2; and

¹ Fisher et al. is owned by BASF AG.

² WO 02/26698 is also owned by BASF AG and also names co-inventors common to the present application.

(d) distillation of stream 5, so as to yield as stream 6 a bottom product which contains 3-pentenitrile, and as stream 7 a head product which contains 2-methyl-3-butenitrile, the (Z)-2-methyl-2-butenitrile depleted 2methyl-3-butenitrile being recycled.

Important to the present invention for producing 3-pentenitrile are the distillative separation steps (c) and (d), as well as to the recycling of the (Z) -2-methyl-2- butenenitrile depleted 2-methyl-3 butenenitrile. For instance, examples in the specification demonstrate unexpected results achievable by the present invention. Along these lines, the claimed process provides low losses of 2-methyl-3 butenenitrile during distillative separation of (Z) 2-methyl-2-butenitrile (cf. example 1-4 of the present specification). This is surprising since the boiling points of both compounds differ only slightly from each other. As mentioned above, claim1 has been amended to recite the pressures used in steps (b), (c) and (d) for achieving results obtainable by the present invention.

As appreciated by the examiner, Drinkard et al. fail to disclose the crucial distillation steps (c) and (d) pointed out above. By contrast to the present invention, Drinkard et al. relate to the isomerization of 2-methyl-3-butenitrile with a Ni [P (OC₂ H₅)₃]₄ catalyst, so as to yield a liquid product stream which is then vacuum-distilled. The distillate includes 2-methyl-3-butene nitrile, 3-pentenitrile, 2-methyl-2-butenitrile and 4-pentenitrile. The bottom stream composition is not further described, but one would expect it to contain the catalytic system and possible solvents.

As mentioned above, the subject matter of present claim 1 clearly differs from Drinkard et al., i.e., by the above-recited distillation steps (c) and (d). This presently claimed combination of features is neither known nor can be directly derived from Drinkard et al., either alone or in combination with Fischer et al. and Jungkamp et al. In particular, the Office has not shown that there would be an apparent reason to modify Drinkard et al. with Fischer et al. and Jungkamp et al.³ Fischer et al. do not overcome the above deficiencies of Drinkard et al. with respect to rendering unpatentable the present invention. Fischer et al. fail to suggest the crucial distillation

³ In fact, the conclusion in the International Preliminary Report on Patentability (copy attached) was that the claims were novel, inventive and had industrial utility.

steps (c) and (d) or the recited recycling according to the present invention. Fischer et al. were relied upon for a disclosure of nickel isomerization catalysts.

WO 02/26698 to Jungkamp et al. does not overcome the above deficiencies of Drinkard et al. with respect to rendering unpatentable the present invention. WO 02/26698 fails to even remotely suggest the isomer mixture treated according to the present invention or the improved results obtainable by the present invention. Furthermore, selection of the pressures employed for distillation steps (b), (c) and (d) along with the particular mixtures subjected to the distillations is not suggested by Jungkamp et al.

Moreover, the relative antiquity of Drinkard et al. is further indicia of the non-obviousness of the present invention. Along these lines, please see *In re Adams* 148 USPQ 743 (CCPA, 1966) and *In re Lechen*, 125 USPQ 396 (CCPA, 1960).

In conjunction with interpreting 35 U.S.C. §103 under *Graham V. John Deere*, 383 U.S. 1, 148 U.S.P.Q. 459 (1966) and *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007), the initial burden is on the Patent Office to provide some apparent reason or suggestion of the desirability of doing what the inventor did, i.e. the Patent Office must establish a *prima facie* case of obviousness. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention, or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. Moreover, MPEP, § 706.02(j), states that "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. Also, please see *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

In addition, the prior art reference (or references, when combined) must teach or suggest all of the claim limitations.

The mere fact that cited art may be modified in the manner suggested in the Office Action does not make this modification obvious, unless the cited art suggests the desirability of the modification or impliedly suggests the claimed invention, or the Examiner has presented a

convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. No such suggestion appears in the cited art in this matter nor has a convincing line of reasoning been presented in this case. The Examiner's attention is kindly directed to *KSR Int'l Co. v. Teleflex, Inc.*, *supra*; *In re Dembiczak et al.*, 50 USPQ2d.1614 (Fed. Cir. 1999), *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984), *In re Laskowski*, 10 USPQ2d, 1397 (Fed. Cir. 1989) and *In re Fritch*, 23, USPQ2d. 1780 (Fed. Cir. 1992).

Furthermore, the cited art lacks the necessary direction or incentive to those of ordinary skill in the art to render a rejection under 35 USC 103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attained by the present invention needed to have a rejection under 35 U.S.C. 103 sustained. See *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007), *Diversitech Corp. v. Century Steps, Inc.*, 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 187 USPQ 774 (CCPA 1975) and *In re Naylor*, 152 USPQ 106 (CCPA 1966). In particular, the claimed process provides low losses of 2-methyl-3 butenenitrile during distillative separation of (Z) 2-methyl-2- butenenitrile (cf. example 1-4 of the present specification). This is quite surprising since the boiling points of both compounds are only slightly different.

Moreover, the properties of the subject matter and improvements which are inherent in the claimed subject matter and disclosed in the specification are to be considered when evaluating the question of obviousness under 35 USC 103. See *KSR Int'l Co. v. Teleflex*, *supra*, *Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 USPQ2d 1923 (Fed. Cir. 1990), *In re Antonie*, 195 USPQ 6 (CCPA 1977), *In re Estes*, 164 USPQ 519 (CCPA 1970), and *In re Papesch*, 137 USPQ 43 (CCPA 1963).

No property can be ignored in determining patentability and comparing the claimed invention to the prior art. Along these lines, see *In re Papesch*, *supra*, *In re Burt et al.*, 148 USPQ 548 (CCPA 1966), *In re Ward*, 141 USPQ 227 (CCPA 1964), and *In re Cescon*, 177 USPQ 264 (CCPA 1973).

CONCLUSION

In view of the above, consideration and allowance are respectfully solicited.

In the event the Examiner believes an interview might serve in any way to advance the prosecution of this application, the undersigned is available at the telephone number noted below.

The Office is authorized to charge any necessary fees to Deposit Account No. 22-0185, under Order No. 12810-00322-US1 from which the undersigned is authorized to draw.

Dated: June 11, 2010

Respectfully submitted,

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TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 0000055304		FOR FURTHER ACTION	See Form PCT/IEPA/416																								
International application No. PCT/EP2005/000781	International filing date (day/month/year) 27.01.2005	Priority date (day/month/year) 29.01.2004																									
International Patent Classification (IPC) or national classification and IPC C07C253/10, C07C255/07																											
Applicant BASF AKTIENGESELLSCHAFT																											
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>6</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <table border="0"><tr><td><input checked="" type="checkbox"/></td><td>Box No. I</td><td>Basis of the report</td></tr><tr><td><input type="checkbox"/></td><td>Box No. II</td><td>Priority</td></tr><tr><td><input type="checkbox"/></td><td>Box No. III</td><td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td></tr><tr><td><input type="checkbox"/></td><td>Box No. IV</td><td>Lack of unity of invention</td></tr><tr><td><input checked="" type="checkbox"/></td><td>Box No. V</td><td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VI</td><td>Certain documents cited</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VII</td><td>Certain defects in the international application</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VIII</td><td>Certain observations on the international application</td></tr></table>				<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand		Date of completion of this report																									
Name and mailing address of the IPEA/EP		Authorized officer																									
Facsimile No.		Telephone No.																									

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2005/000781

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language _____ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
 - ☐ publication of the international application (Rule 12.4)
 - ☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-94 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____

- ☒ the claims:
- nos. _____ as originally filed/furnished
- nos* _____ as amended (together with any statement) under Article 19
- nos* 1-16 _____ received by this Authority on 18.11.2005 with letter of 11.11.2005
- nos* _____ received by this Authority on _____

- ☒ the drawings:
- sheets 1/10-10/10 _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2005/000781

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-16	YES
	Claims	NO
Inventive step (IS)	Claims 1-16	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-16	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

This report makes reference to the following documents:

- D1: US 3 536 748 A (WILLIAM C. DRINKARD JR ET AL), 27
October 1970 (1970-10-27)
- D2: EP 0 274 401 A (E.I. DU PONT DE NEMOURS AND
COMPANY), 13 July 1988 (1988-07-13)
- D3: WO 99/07671 A (BASF AG; FISCHER, JAKOB; SIEGEL,
WOLFGANG), 18 February 1999 (1999-02-18)

The present application relates to a process for
producing 3-pentene nitrile characterised by the
following steps:

- (a) isomerisation of an edduct stream which contains 2-
methyl-3-butene nitrile, with at least one dissolved or
dispersed isomerisation catalyst, so as to produce a
stream 1 which contains at least one isomerisation
catalyst, 2-methyl-3-butene nitrile, 3-pentene nitrile
and (Z)-2-methyl-2-butene nitrile;
- (b) distillation of stream 1, so as to yield a stream 2
as a head product which contains 2-methyl-3-butene
nitrile, 3-pentene nitrile and (Z)-2-methyl-2-butene
nitrile, and a stream 3 as a bottom product which
contains at least one isomerisation catalyst;

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

(c) distillation of stream 2, so as to yield a stream 4 as a head product which, in comparison with stream 2, is richer in (Z)-2-methyl-2-butene nitrile, relative to the sum of all pentene nitriles in stream 2, and a stream 5 as a bottom product which, in comparison with stream 2, is richer in 3-pentene nitrile and 2-methyl-3-butene nitrile, relative to the sum of all pentene nitriles in stream 2;

(d) distillation of stream 5, so as to yield as stream 6 a bottom product which contains 3-pentene nitrile, and as stream 7 a head product which contains 2-methyl-3-butene nitrile, the (Z)-2-methyl-2-butene nitrile-depleted 2-methyl-3-butene nitrile being recycled.

D1 (see the passages cited in the ISR) represents the closest prior art and discloses the isomerisation of 2-methyl-3-butene nitrile with a $\text{Ni(0) [P(OC}_2\text{H}_5)_3]_4$ catalyst, so as to yield a liquid product stream which is then vacuum-distilled. The distillate comprises 2-methyl-3-butene nitrile, 3-pentene nitrile, 2-methyl-2-butene nitrile and 4-pentene nitrile; the bottom stream composition is not further described, but should contain the catalytic system and possible solvents. The subject matter of claim 1 thus differs from D1 by the distillation steps (c) and (d).

The technical problem addressed is thus considered to be that of providing another process for producing 3-pentene nitrile. The solution is presented in claim 1 and relates to the distillative separation steps (c) and (d), as well as to the recycling of the (Z)-2-methyl-2-butene nitrile-depleted 2-methyl-3-butene nitrile.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

This combination of features is neither known nor can be directly derived from the closest prior art in D1, either alone or in combination with D2 or D3. Also surprising for a person skilled in the art are the low losses of 2-methyl-3-butene nitrile during the distillative separation of (Z)-2-methyl-2-butene nitrile (cf. examples 1-4 of the present application), since the boiling points of both compounds are only slightly different.